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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,400	10/16/2003	Zhang-Lin Zhou	200300077-1	1347

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FORT COLLINS, CO 80527-2400

EXAMINER
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MARTINEZ, JOSEPH P

ART UNIT	PAPER NUMBER
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2873

MAIL DATE	DELIVERY MODE
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11/27/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/688,400

Applicant(s)

ZHOU ET AL.

Examiner

Joseph Martinez

Art Unit

2873

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 15-34, 53, 54, 57-61 and 74 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-19, 21, 27, 53, 54, 57-61 and 74 is/are rejected.
- 7) ☒ Claim(s) 20, 22-26 and 28-34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 57, 58, 60, 61 and 74 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Abramson et al. (6950220).

Re claim 57, Abramson et al. teaches for example in fig. 4 and 6, an optical switch comprising: a first electrode (608); a second electrode (616, 618) opposite said first electrode (fig. 6); and a molecular system (612) connected to said first electrode and connected to said second electrode (via 610, 620), said first and second electrodes (608, 616, 618) capable of generating an electric field, said molecular system providing two different colors based on two different oxidation states (col. 15, ln. 33-34) of at least one digital dye in said molecular system (440), said digital dye having an optical change resulting from an electrochemical oxidation/reduction reaction (col. 15, ln. 33-34).

Re claim 58, Abramson et al. further teaches for example in fig. 4 and 6, said molecular system changes between a transparent state and a colored state (col. 15, ln. 33-34).

Re claim 60, Abramson et al. further teaches for example in fig. 4 and 6, said molecular system changes between a one index of refraction and another index of refraction (col. 15, ln. 33-34).

Re claim 61, Abramson et al. further teaches for example in fig. 4 and 6, assembling devices from the group consisting of displays (col. 15, ln. 55-60).

Re claim 74, Abramson et al. further teaches for example in fig. 4 and 6, a display device (col. 15, ln. 55-60).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 15, 16 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramson et al. (6950220) in view of Fitzmaurice et al. (6301038).

Re claim 15, supra claim 57. Furthermore, Abramson et al. further teaches for example in fig. 4 and 6, at least one digital dye (440).

But, Abramson et al. fails to explicitly teach a charge complex.

However, within the same field of endeavor, Fitzmaurice et al. teaches for example, a charge complex (col. 2, formula II).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. with the teachings of Fitzmaurice et al. in order to provide transmittance change by reduction or oxidation, as taught by Fitzmaurice et al. (col. 2, ln. 3-5).

Re claim 16, supra claim 57.

But Abramson et al. fails to explicitly teach the disclosed general model.

However, within the same field of endeavor, Fitzmaurice et al. teaches for example, said molecular system is based on the general model provided, where: Con1 and Con2 are optional connecting units between one molecule and another molecule or between a molecule and a substrate, are either a single connecting unit or multiple connecting units, and are selected from the group consisting of hydrogen (utilizing a hydrogen bond) (col. 2, formula II), multivalent hetero-atoms selected from the group consisting of C, N and P (col. 2, formula II), functional groups containing said hetero atoms, saturated or unsaturated hydrocarbons, and substituted hydrocarbons; said metal complex contains at least one hetero atom selected from the group consisting of N, P, O, where M has two different oxidation states; and said chromophore is a natural or synthetic colorant (col. 2, ln. 16-30; formula II).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. with the teachings of Fitzmaurice et al. in order to provide transmittance change by reduction or oxidation, as taught by Fitzmaurice et al. (col. 2, ln. 3-5).

Re claim 53, supra claim 57. Furthermore, Abramson et al. further teaches for example in fig. 4 and 6, a digital dye (440).

But, Abramson et al. fails to explicitly teach said digital dye has two ends and includes a linking group on at least one said end to form said molecular system.

However, within the same field of endeavor, Fitzmaurice et al. teaches for example, said digital dye has two ends and includes a linking group on at least one said end to form said molecular system (col. 2, formula II).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. with the teachings of Fitzmaurice et al. in order to provide transmittance change by reduction or oxidation, as taught by Fitzmaurice et al. (col. 2, ln. 3-5).

2. Claims 17-19, 21, 54 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abramson et al. (6950220) in view of Fitzmaurice et al. (6301038) and in further view of Elliott et al. (4611890).

Re claim 17, *supra* claim 16. Furthermore, Abramson et al. in view of Fitzmaurice et al. further teach for example, a metal complex (Fitzmaurice et al.; col. 3, ln. 40-45).

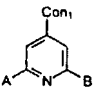
But, Abramson et al. in view of Fitzmaurice et al. fail to explicitly teach said metal complex is represented by one of the following formulae:  $(X)_n M L_1 L_2$ ,  $(X)_2 M (L_1)_2$ , or  $(L_1)_2 M L_2$ , wherein M represents a metal atom selected from the metals listed in Groups IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, and IIB of the Periodic Table, X represents a polar group, and L1 and L2 represent any hetero atom containing ligands which have at least one said connecting group Con1 or Con2, and n is an integer between 1 and 8.



However, within the same field of endeavor, Elliott et al. teaches for example, said metal complex is represented by one of the following formulae:  $(X)_n M L_1 L_2$  (col. 4, structure VI),  $(X)_2 M (L_1)_2$  (col. 3, structure I or II), or  $(L_1)_2 M L_2$  (col. 4, structure VI), wherein M represents a metal atom selected from the metals listed in Groups IIIA, IVA, VA, VIA, VIIA, VIIIA, IB, and IIB of the Periodic Table (col. 4, ln. 1-2), X represents a polar group (col. 4, ln. 8-9), and L1 and L2 represent any hetero atom containing ligands which have at least one said connecting group Con1 or Con2, and n is an integer between 1 and 8 (col. 3, structure III).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. in view of Fitzmaurice et al. with the teachings of Elliott et al. in order to provide multiple color changing chromophores, as taught by Elliott et al. (col. 6, ln. 59-66).

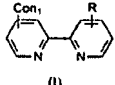
Re claim 18, Elliott et al. further teaches for example, M is a Group VIII metal (col. 4, ln. 7) and wherein X is selected from the group consisting of hydroxyl (col. 4, ln. 14).

Re claim 19, Elliott et al. further teaches for example, wherein L1 and L2 are

selected from the group consisting of  (col. 12, structure XVIII), wherein A and B may be the same or different groups independently selected from H and any of the

following structures:  (col. 12, structure XVIII);  (col. 12, structure XIX), wherein R1, R2, R3, R4, R5, R6, R7, R8 and R9 each represents a hydrogen atom or an organic substituent such as a hydroxyl group, a lower alkyl group such as C1-C6 alkyl group (col. 12, ln. 14-29).

Re claim 21, Elliott et al. further teaches for example, L1 and L2 are nitrogen-containing polycyclic compounds selected from the group consisting of bipyridines (I)

(col. 5, ln. 66):  (col. 3, structure III), where R represents a hydrogen atom or an organic substituent selected from the group consisting C1-C6 alkyl group (col. 3, ln. 48-59).



Re claim 54, *supra* claim 53. Furthermore, Abramson et al. in view of Fitzmaurice et al. further teach for example, chemical bonding is achieved with terminal groups on said digital dye (Fitzmaurice et al.; col. 2, formula II).

But, Abramson et al. in view of Fitzmaurice et al. fail to explicitly teach terminal groups selected from the group consisting of thiols, thiol terminated alkenes and –COOH - terminated chains or groups.

However, within the same field of endeavor, Elliott et al. teaches for example, terminal groups selected from the group consisting of –COOH-terminated chains or groups (col. 5, ln. 30-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. in view of Fitzmaurice et al. with the teachings of Elliott et al. in order to provide multiple color changing chromophores, as taught by Elliott et al. (col. 6, ln. 59-66).

Re claim 59, Elliott et al. further teaches for example, said molecular system changes between one colored state and another colored state (col. 6, ln. 59-66).

3. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abramson et al. (6950220) in view of Fitzmaurice et al. (6301038) in further view of Elliott et al. (4611890) and still in further view of Yamashita (3963314).

Re claim 27, *supra* claim 17.

But, Abramson et al. in view of Fitzmaurice et al. and in further view of Elliott et al. fail to explicitly teach a colorant is selected from the group consisting of (a) dyes based on polyenes and polymethines; (b) polyarylmethine dyes and their aza analogs; (c) aza [18] annulenes and phthalocyanine colorants; (d) nitro and nitroso dyes; (e) azo dyes and pigments; (f) carbonyl dyes and pigments; and (g) BODIPY dyes.

However, within the same field of endeavor, Yamashita teaches for example, a colorant is selected from the group consisting of (a) dyes based on polyenes and polymethines (col. 4, ln. 24); (c) aza [18] annulenes and phthalocyanine colorants (col. 4, ln. 36); (d) nitro and nitroso dyes (col. 4, ln. 13-14); and (e) azo dyes and pigments (col. 4, ln. 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Abramson et al. in view of Fitzmaurice et al. and in further view of Elliott et al. with the teachings of Yamashita et al in order to provide a variety of colors, as taught by Yamashita (col. 4, ln. 14-24).

#### ***Allowable Subject Matter***

Claims 20, 22-26 and 28-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art taken alone or in combination fails to anticipate or fairly suggest the limitations of the claims, in such a manner that a rejection under 35 USC 102 or 103

would be proper. The prior art fails to teach a combination of all the claimed features as presented in dependent claims 20, 22 and 28-34.

Specifically regarding claims 20, 22 and 28-34, Abramson et al. (6950220), Fitzmaurice et al. (6301038) and Elliott et al. (4611890) teach the state of the art of redox chromophore compounds.

But, Abramson et al., Fitzmaurice et al. or Elliott et al. fails to explicitly teach a combination of all the claimed features including the claimed chemical structure and formulae, as claimed.

As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

### ***Response to Arguments***

Applicant's arguments filed 9-4-07 have been fully considered but they are not persuasive.

Re applicant's arguments on p. 16-17, wherein the applicant argues that the prior art does not disclose redox chromophores are not directly connected to conductive layers and therefore do not teach the claimed limitations, have been considered, but are not persuasive. The applicant does not claim the molecular system is "directly" connected to the electrodes. Furthermore, the examiner interprets fig. 4 and 6 of

Abramson et al. (6950220) to teach the redox chromophores (612) are connected to conductive layers (608, 616, 618) via 610 and 620 and therefore teaches the claimed limitations.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

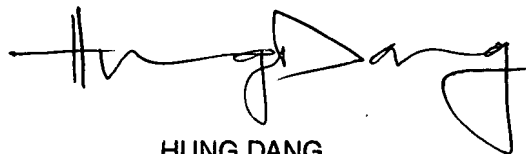
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph P. Martinez whose telephone number is 571-272-2335. The examiner can normally be reached on M-F 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Mack can be reached on 571-272-2333. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Joseph Martinez/  
Patent Examiner, AU 2873  
11-25-07

A handwritten signature in black ink, appearing to read 'Hung Dang', with a stylized, elongated final stroke.

HUNG DANG  
PRIMARY PATENT EXAMINER